Non–Traditional Reinsurance–From Variable Annuity Reinsurance to P&C Natural Catastrophe Bonds

Annuity Reinsurance

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Society of Actuaries Life Spring Meeting, Québec, QC
June 18, 2008

RGA

Annuity Reinsurance

- **What is annuity reinsurance, and where has it been?**
- **How does annuity reinsurance compare to other risk management and capital tools?**
- **How does annuity reinsurance differ from mortality reinsurance?**
- **What do annuity reinsurers bring to the table?**
- **Annuity reinsurance considerations**
- **The annuity reinsurance marketplace**

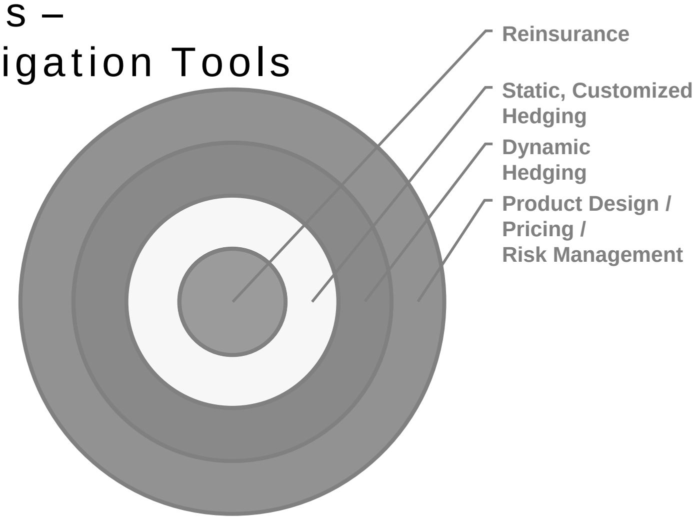
What is annuity reinsurance?

- **Just like reinsurance of other products**
- **Many more “moving parts”**
- **More fun than an actuary should be allowed to have**

Where has annuity reinsurance been?

- **Fixed deferred (and fixed index) annuities – capacity has been available for a long time**
- **Variable annuities – capacity for full reinsurance of GMDB / IB dried up in 2000-2002, came back in 2006-07**
- **In-force deals can be challenging**

Annuities –
Risk Mitigation Tools



Annuities –
Matching Risks to Risk Mitigation Tools

	M Macroeconomic	A Actuarial	O Operational	I Intersection
Product Design				
Dynamic Hedging				
Static Hedging				
Reinsurance				

Reinsurance versus Other Forms of Capital

- **Equity**
- **Debt**
- **Hybrids**
- **Securitizations**

Mortality Reinsurance versus Annuity Reinsurance

	Mortality Reinsurance	Annuity Reinsurance
Information asymmetry	**Yes**	**No**
Reinsurer pricing advantage	**More credible experience**	**Capital**
Reinsurance vs. retail pricing	**Less**	**Whole product: less**
Administration and reporting	**Complex**	**Even more complex**
Sensitivity to emerging experience	**Low to Moderate**	**High**
Risk sharing	**Minimum retention; Fac. Underwriting**	**Significant retention; Adjustable premiums / commissions**
Reinsurers	**Many**	**Handful**
Counterparty risk (per unit)	**Small**	**Larger**

What do reinsurers bring to the table?

- Risk appetite / capacity
- Different internal offsets
- Pricing discipline
- Affirmation / validation
- Better accounting for direct writer
- Longer-term view
- But, we haven't repealed the laws of economics

Annuity reinsurance considerations

- Risk sharing / direct-writer retention
- Accounting / regulatory issues
- Coinsurance vs. modco / funds-withheld vs. combinations
- (VA) Rider-only vs. base + rider

Not All Reinsurance Is Created Equal

- **Custom hedges in "reinsurance wrapper"**
- **Caps, deductibles, and limits**
  - Per policy and in aggregate
- **May have difficulty taking statutory reserve credit in some states**
- **Move to principles-based reserves and capital may further highlight these differences**

The Annuity Reinsurance Marketplace

- **Small number of players providing true reinsurance**
- **Capacity: large, but unknown**
- **(VA) Typical pricing is either:**
  - Base + guarantee(s), with discount; or
  - Guarantees only, with extra premium
- **Uncertainty around policyholder behavior → more risk sharing**
- **Reinsurers are subject to the same macroeconomic environment**

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Deferred Annuity Reinsurance

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Swiss Re

Nonlife Insurance-Linked Securities and Related Solutions

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2008 Spring Meeting

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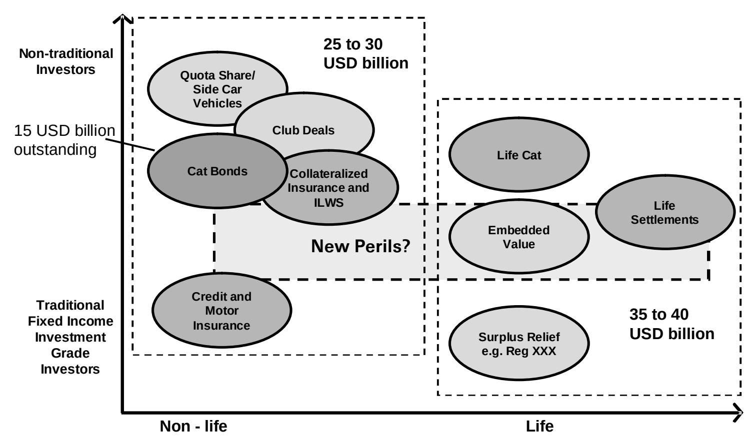
Market Segmentation and Size



As of March 5, 2008
Source: Swiss Re Capital Markets

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Market Segmentation: Basic Terms

- **Cat Bond:** source of collateralized excess of loss (re)insurance capacity raised in a private placement offering
- **Sidecar:** source of proportional (re)insurance capacity raised in a private placement offering
- **Industry Loss Warranty or ILW:** catastrophe protection where the payoff depends in whole or in part on whether industry losses from an event exceed a predetermined amount
- **Club Deal/Private Deal:**
  - Transaction with either a handful investors or even a single capital markets investor
  - Investors take risk on in derivative, securities or reinsurance form

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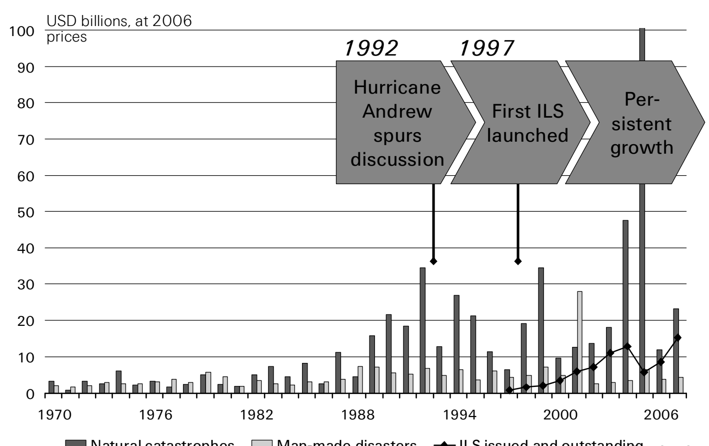
Increasing Catastrophe Claims

Development of catastrophe losses and insurance linked securities (ILS)



Note:
The natural catastrophe losses also include flood losses in the US insured via the National Flood Insurance Program (NFIP). Source: Swiss Re, sigma No 2/2007

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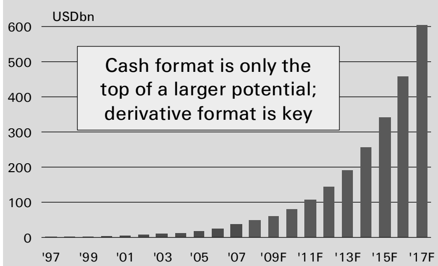
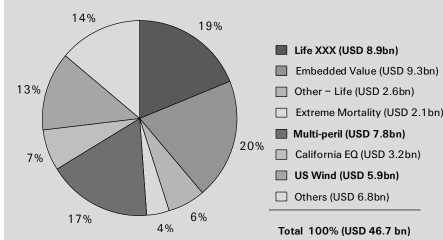
Transfer to Capital Markets May Increase

Potential future growth of ILS outstanding
Projections using 75% of actual historical CAGR



Source: Swiss Re Capital Markets

Risks Securitized from 1997-2008*
in USD billions



*As of 5 March 2008
Source: Swiss Re Capital Markets

securitization, ILW, collateralised quota shares and sidecars add to the flexibility of capital in the industry

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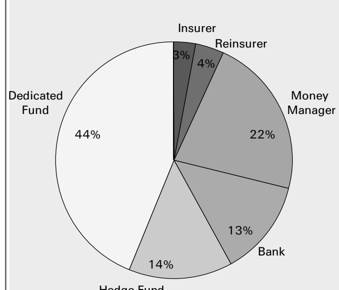
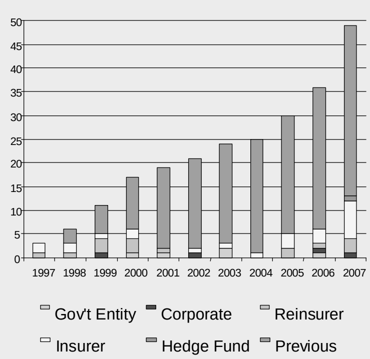
Who Participates in the ILS market?

A diverse range of institutional investors participate in the sector



Market size » USD 15.4 bn

Primary insurance companies make up the largest percentage of sponsors



As of 5 March 2008
Source: Swiss Re Capital Markets

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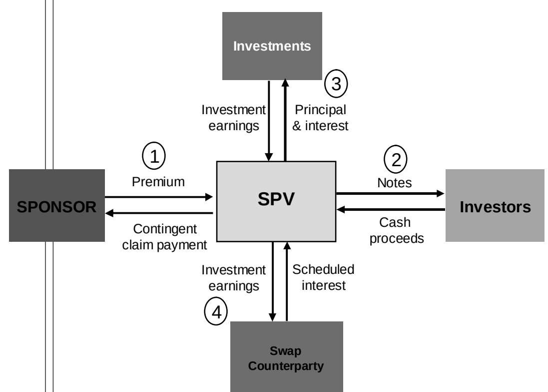
Focus on Cat Bonds: Typical Structure



1. The Sponsor enters into a financial contract with a Special Purpose Vehicle (SPV)
2. The SPV hedges the financial contract by issuing Notes to investors in the capital markets
3. Proceeds from the securities offering are invested in high quality securities and held in a collateral trust
4. Investment returns are swapped to a LIBOR - based rate by the Swap Counterparty

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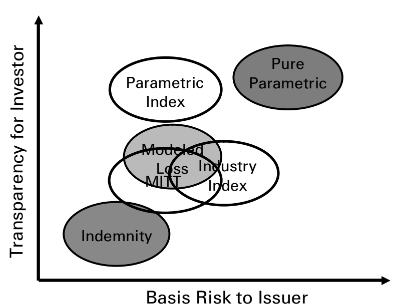
Focus on Cat Bonds: Trigger Types



- An **indemnity** transaction is based on the actual losses of the sponsor
- An **industry index** transaction is based on an industry-wide index of losses (e.g., Property Claim Services or "PCS" in the United States)
- A **pure parametric** trigger is based on the actual reported physical event (i.e., magnitude of earthquake or wind speed of hurricane)
- A **parametric index** is a more refined version of the pure parametric trigger using more complicated formulas and more detailed measuring locations
- In a **modeled loss** transaction, losses are determined by inputting actual physical parameters into an escrow model which then calculates the loss
- In a **Modeled Industry Trigger Transaction** ("MITT")*, industry index weights are set post-event using modeled loss techniques

** Developed and patented by Swiss Re*

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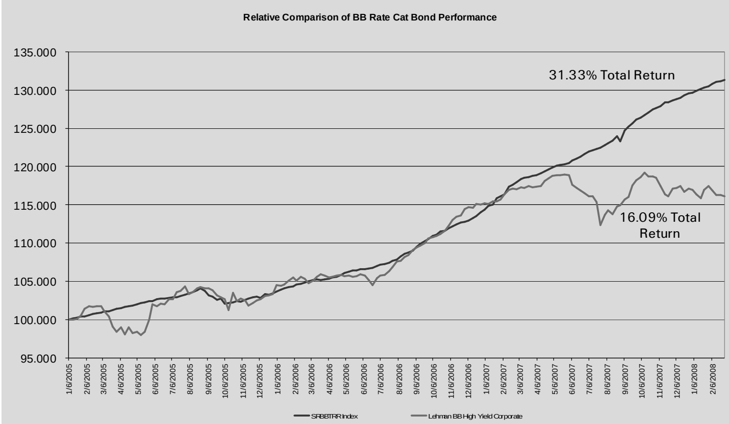
Focus on Cat Bonds: Cat Bond and Corporate BB Returns

BB Performance from 1 January 2005 – 1 March 2008



"SRBB Cat Bond Index", calculated by Swiss Re Capital Markets, is an equally-weighted basket of nat cat BB-rated cat bonds traded by Swiss Re Capital Markets, calculated on a weekly basis; past performance is no guarantee of future results
Underlying data for Lehman BB Index provided by Lehman Brothers

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Alternative Mortality Reinsurance

Jeff Poulin, Senior VP, Canada Life Re

June 18, 2008

SOA Meeting – Quebec City

strength • stability • solutions

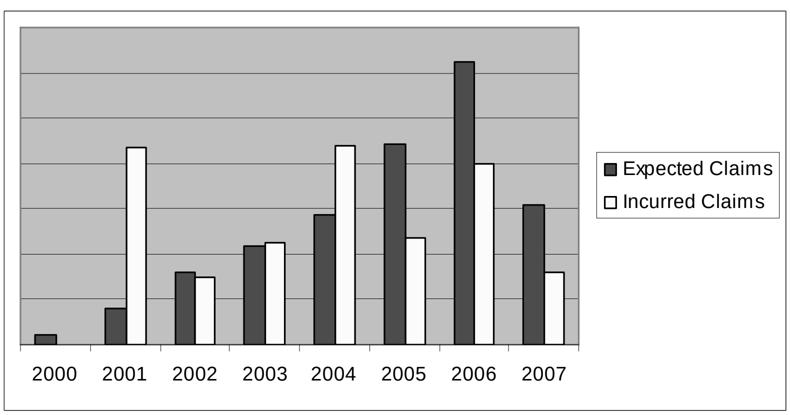
Changes in Demand for Mortality Reinsurance

- Increased Retention
- Mergers
- More Capital – Larger insurers
- Increased Price of Reinsurance
- Change in Demographics – retirement products are more popular

Resulting Issues:

- Volatility
- Additional C2 capital
- More exposure to catastrophes
- More exposure to pandemics
- More exposure to long term deterioration of mortality
  - Obesity
  - New diseases
  - Worsening of economic conditions
  - Lifestyles
- More exposure to longevity risk

Actual YRT Block



Yr	00	01	02	03	04	05	06	07	Avge
A/E%	0	549	94	192	113	97	49	52	97

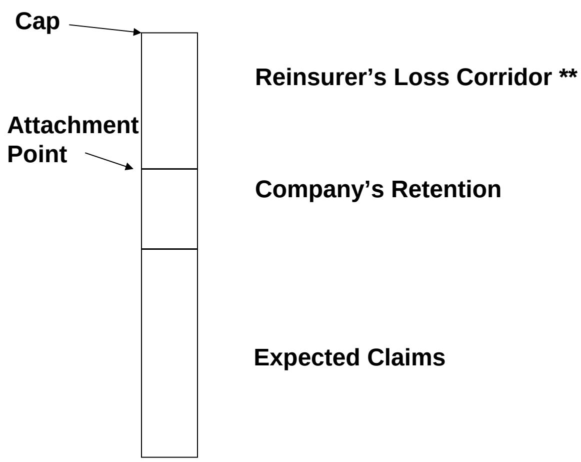
Cat Cover:

- Cat programs have been around for a long time
- Cost went up after 9/11
- Cost has come back down again e.g. 2 rate on line or less (2% of exposure bought)
- Less exclusions than after 9/11
- Minimum 3 to 5 lives and a large amount e.g. $20M
- Event needs to be well defined

Pandemic Cover

- Usually 1 year cover with extension if a pandemic is declared before the end of the treaty year
- 3 to 5 years structures were done
- Can be based on actual portfolio or on population data (ie indexed)
- Usually requires a WHO level 6 pandemic declaration
- Reinsurer pays all the claims above a certain level up to a cap
- ROL varies between 1 and 10

Pandemic Structure

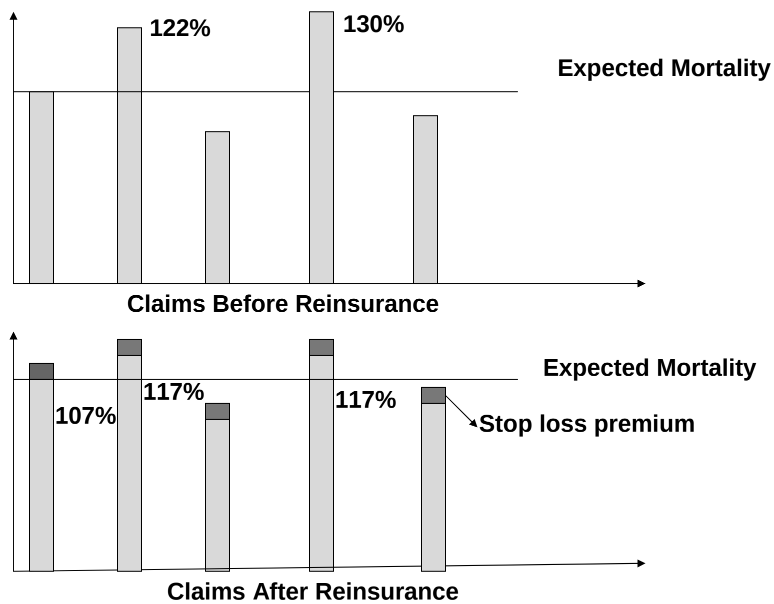


**** only pays if a level 6 pandemic is declared by WHO**

Multi – Year Stop Loss Cover

- Controls volatility, catastrophes and pandemic risks
- Cheaper than quota share because it attaches at a higher level
- Attachment point is a percentage of expected claims determined every year. This process is not easy and needs to be well defined
  - Could be based on an annual mortality study
  - Needs to take into account sales, lapses and NAR
  - Minimum hard $ amount is needed to reduce risk against a drop of in force business
- Usually there is a cap on the amount covered and if sales are greater than expected, the reinsurer covers only a percentage of the total claims
- 4-5 years with an attachment point that varies each year

Multi – Year Stop Loss Cover



Multi – Year Stop Loss Cover

- Advantages:
- If the mortality improves, the Cedant can renegotiate reinsurance cost/attachment point after 4-5 years
- Cheaper than YRT or quota share
- Helpful in the first few years after a raise in retention

- Disadvantages:
- Cedant retains more risk during the contract years and after
- Cost of renewing after 4-5 years could go up if experience is bad
- Current capital formula is not reduced by the cover

SWAP on Mortality Book

- Reinsurer guarantees the mortality cashflows on an in force block of business
- Cedant pays guaranteed cashflows
- Reinsurer pays actual cashflows

- Lapses are an issue (included or not)
- If the Swap is long enough, the capital treatment should be similar to YRT reinsurance

Longevity SWAP on Annuity Book

- Reinsurer guarantees the mortality cashflows on an in force block of payout annuity or structured settlement business
- Cedant pays guaranteed cashflows
- Reinsurer pays actual cashflows
- Inflation adjustment can be included or not
- Long term credit risk can go both ways
- Premium = Greater of (0 and guarCF – actual CF)
- Claims = Greater of (0 and Actual CF – Guar CF)

Quota Share of Large Inforce Mortality Book

- Full risk sharing
- Use stable, profitable block
- Modco or co funds withheld
- Assets can stay with the Cedant or are moved to the Reinsurer's books in a trust and the Reinsurer hires the Cedant as an asset manager – this avoids the derivative accounting issue

Quota Share of Large Inforce Mortality Book

- The block could include annuities or other businesses
- Large Experience Refunds paid back to the Cedant
- A Loss Carryforward account would be set up in cases of losses
- Save C1, C2 and C3 capital
- Avoids potential pandemic/cat risk negative earning issues
- Lower the volatility of results 0 being the worst possible case in a given year

YRT at larger rates than market

- Reduces C2 capital
- Reduces potential cat and pandemics
- Large experience refunds
- Cedant gets most of the upside of the mortality profit but avoids potential large deviations
- Europeans use this approach